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ABSTRACT

An experiment assessed the potential effectiveness of "dual audio television instruction" (DATI) as a mass education medium. The DATI consisted of a radio program heard by children while they watched television shows. The audio instructor did not talk when the television characters spoke, but used the "quiet" times to help with reading, define vocabulary, explain concepts, and point out problem solving processes. The study used children from 70 homes. The control group watched television programs as they normally would, whereas the experimental group was exposed to DATI. The results showed that the technical arrangements were feasible, that the children exposed to DATI voluntarily accepted it, and that they learned significantly more reading, vocabulary, and process skills than did the control group. The experimental group also talked more during the show and made more cognitively complex comments. (PB)

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DUAL AUDIO TV INSTRUCTION

A BROADCAST EXPERIMENT

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SUMMARY

This report describes a month-long experiment conducted to assess the potential effectiveness of "dual audio TV instruction" as a mass educational medium. Dual audio TV instruction consists of a radio program designed to be heard by children in their homes while they are watching their favorite TV shows. The dual audio instructor does not talk when the TV characters are talking, but uses "quiet times" between the talk of TV characters to help with reading, define vocabulary, explain concepts, and point out problem solving processes. The experiment reported here was a field study conducted in the homes of seventy primary children, using one group of children who watched an afternoon cartoon program as they ordinarily would, and a second group who could also listen to the dual audio instruction if they wanted to. The results of the experiment showed that all the necessary arrangements with the TV and radio stations could be made and maintained; that the children voluntarily listened to the program a high percentage of the time; that they learned significantly more reading, vocabulary, and process skills as a result of dual audio instruction; that they talked more during the show and made more cognitively complex comments; and that they and their parents like having dual audio instruction available to them. A discussion of possible further research, practical applications on a mass scale, and value questions concludes the body of the report.

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DUAL AUDIO TV INSTRUCTION
A BROADCAST EXPERIMENT

THE PROBLEM:

The average American childs spends about thirty hours a week watching TV. While Sesame Street and The Electric Company have radically increased the educational impact of television and have encouraged commercial network educational programming, most of a child's viewing time is spent on shows like The Brady Bunch, Spiderman, and Astro Boy--shows that are primarily entertainment, not education. Such entertainment holds geniune educational potential for children, since most entertainment programs are full of new vocabulary, ideas, ways of solving problems, things to read, and inter-personal processes. The problem is that while children are exposed to this information on TV, they do not learn much of it, though they may learn other kinds of skills.*

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*At typical peak viewing times in Philadelphia's metropolitan area, there are three times more children watching entertainment shows than watching Sesame Street, four times more than watching The Electric Company, two times more than watching The Curiosity Shop, and forty times more than watching Take A Giant Step (Nielsen, 1971). See learning research reviews by Maccoby, 1964; Cazden, 1966; Harrison and Scriven, 1969; other skills described by Gans, 1968; Gattegno, 1969.

DUAL AUDIO INSTRUCTION:

In this study, conducted by the Dual Audio Television Project of the Philadelphia Board of Education's Curriculum Office, we hypothesized that the use of supplementary "dual audio instruction" would increase the educational impact of commercial television by increasing children's understanding of the reading, vocabulary, and intellectual processes available on popular TV shows.

Dual audio instruction consists of a radio program which a child hears while he is watching his favorite TV program. The instruction occurs when the characters in the program are not talking, so that it does not ride over the TV audio nor detract from the show's entertainment value. Because these "usable times" are short, the instructor's comments have to be brief, but even ten seconds is sufficient to explain a vocabulary word or an unfamiliar idea, point out a problem-solving process which the characters are using, raise a question about inter-personal relations, or ask the child for his own reactions to the show.

For example, as part of the experiment to be described here, we prepared the following dual audio script for Astro Boy, the cartoon show which was used in the test: At the start of the opening sequence the dual audio instructor, Steve, introduced himself and gave a hint about what he would be concentrating on that day. Then he began singing along with the theme song, often parodying it. When the words "Astro Boy" appeared on the screen, he asked the children to read them. During the commercial break,

he made no comments, but when the show began, so did he. The Astro Boy story started with a sequence about the historical study of astronomy, mixing fantasy and truth together. Steve pointed out what was true and what was not. When trouble arose in the ocean, the TV program told the children that Astro Boy was sent off to investigate; Steve told them what "investigate" meant, and illustrated it several times during the next few minutes of action. When Astro Boy was thought to be a criminal by the police, Steve explained that the mistake was because of the point of view of the police, and generalized about the meaning of "point of view." Astro Boy came upon a huge dam; Steve explained how it worked and asked the children if they had ever built one in the gutter. The theme music shifted with a change in mood; Steve pointed the shift out and asked the children how the music made them feel. As the section closed before the commercial and Astro Boy headed back to the laboratory with some evidence, Steve returned again to the meaning of "investigate," and left the children wondering how Astro Boy would go about investigating the problem. (See Appendix A for a sample script.)

SURVEY OF THE LITERATURE:

There is little indication in the literature, other than previous studies on "dual audio instruction" itself, that such a methodology could be an effective means of making commercial TV more educational.

Discussion of multi-channel reception of information (such as dual audio seems to imply) has concentrated mainly on what happens when discrepant information is received simultaneously from several sources or over different visual or aural channels. The research is voluminous (See reviews by Hartman, 1961; Hsia, 1971), but, although of theoretical importance, these studies do not contribute much to an understanding of dual audio instruction because the dual audio information is not simultaneously received, nor discrepant. The dual audio voice does not talk at the same time as the TV characters are speaking, and a concentrated effort is made to keep the narration from jerking the child away from the context of the program.

The literature on instructional television (ITV) is not helpful in illuminating the problems of dual audio, because almost all of these studies are concerned with the comparative effects of live vs. televised instruction. (See review in Briggs et al., 1967). While the formative research on Sesame Street (Reeves, 1970) has been helpful to us in understanding the reactions of children to TV, and in developing instructional strategies, it does not offer a clearer grasp of what happens when a regular program is supplemented with additional information.

The most directly relevant research is that done with audio or visual supplements to instructional films. Kantor's (1960) study used both visual and aural supplements, with eight questions inserted into a ten minute film, and found no significant differences in what was learned.

In the aural approach, the narration of the film was completely re-done, so that the effect was to make these questions into rhetorical comments of the film's narrator, which may account for the lack of significant learning. Davis (1965) went to the opposite extreme. Using both visual and aural approaches, he repeated one of four messages every two seconds and found significant differences in student learning. As might be expected, he also found that students were antagonized by the constant jarring interruption of the program they were watching, and did not want to repeat the experience.

Previous studies specifically conducted on dual audio instruction have indicated that providing supplemental information to commercial entertainment TV shows can make a significant difference in what children learn from watching such programs. One study (Borton, 1971), conducted with two hundred children who watched ten minute selections of TV in small groups under simulated home conditions, showed that dual audio produced statistically significant gains in the areas of reading, factual knowledge, vocabulary, concepts, and understanding of problem-solving skills, with experimentals usually making half as many mistakes as controls. Experimentals were also much more active than controls, making four times as many verbal and gestural reactions to the TV program. (The article in which this study is reported also contains a discussion of the feasibility of dual audio instruction, psychological implications, questions of control, etc.). The findings of this initial research were confirmed by a two week clinical study conducted with thirty children in their inner city homes using a half-hour program played on a video tape machine. (Borton and Morrow, 1970b). A major

purpose of this study was to find indications of whether children would use a dual audio supplement under field conditions, and what factors would contribute to such use. Evidence indicated that dual audio would be used if the quality of the narration were good, if the narrator's voice carried the sense of a warm and supportive personality, and if the students could have easy access to the dual audio receiver, such as through an ear bug.

Several preliminary studies were conducted by the Dual Audio TV Project in the period from November 1971 to March 1972 preceding the month-long field experiment detailed in this report. These studies, which began in a lab setting and moved toward a progressively more "real" context, were designed to give us as much information on the effects of dual audio as possible before dual audio instruction actually went on the air, and to serve as progressively more complex replications of preceeding work. (See Appendix G for detailed account). Initial informal tests were conducted at the Durham Child Development Center, a racially and socially balanced school operating on the "informal" education philosophy. Children were shown short segments of dual audio television in a laboratory setting. Their responses were recorded in order to determine what style of dual audio instruction was most effective in generating positive responses. Personal, non-gimicky instruction was compared with cartoon-style instruction using character voices, and found to be more effective, confirming the results of the field study. Contradicting earlier evidence, we found that

ear bugs inhibited the freedom of movement and amount of social interaction among children watching dual audio television. A small radio which children could hold in their own hands was found to be a more effective dual audio receiver.

In February,1972 the project conducted an eleven day laboratory usage test to ascertain if 7-9 year old children would continue to use the dual audio supplement with ½-hour cartoon shows. Detailed video-taped observations were made of usage patterns each day and the number and types of dual audio responses were recorded. Although control conditions were not strictly maintained and the sizes of the groups of children coming to the laboratory varied from 3-5, the children involved used the dual audio supplement 87% of the time when watching the programs and made an average of 2.6 positive responses to the dual audio instruction per show.

Prior to the broadcast experiments, a one-day test of dual audio technical feasibility was conducted to determine whether technical difficulties had been overcome. There were no problems in broadcasting the dual audio instruction over the radio in complete synchronization with the television program. Both were pre-recorded on the same two-inch video tape and broadcast simultaneously, the dual audio portion being bled off the cue track and carried on a phone cable to the radio station for transmission over the air. Reports indicated that reception was clear and complete in all areas of the city on both home FM radios and the transistorized fixed tuned FM radios supplied by the Project.

Next the Project conducted a controlled study of twenty-four children, 12 control and 12 experimental, drawn from a 2nd grade class at the Meade Elementary School, a Title One (poverty) school in North Philadelphia. The study had two major purposes: to explore the characteristics of the Meade School population in preparation for the longer studies to follow, and to determine learning differences after four days of dual audio instruction for ½-hour a day. On a test of eight items of information learned during this experiment the mean score was 2.8 for experimentals and 1.2 for controls. The Meade School population was found to be similar to the Durham School children studied earlier in the year in interaction response patterns, amount of information learned, and enjoyment of dual audio.

Immediately preceding the month-long field experiment, the Project conducted a week-long field study of dual audio instruction under actual broadcast conditions using the Spiderman cartoons. A sample of twenty-four children, 12 experimental and 12 control, were drawn from three 2nd grade classes in the Meade School. This study was designed as a trial run for the larger experiment and to gather additional information about: the technical process of producing and broadcasting dual audio; children's usage habits, response patterns, and learning achievements; the reliability of various reporting procedures; and the appropriateness of dual audio instructional content for the sample population.

The major findings of this study were that dual audio children used the radios provided by the Project when watching the show 94% of the time, and made an average of 4.3 positive responses to the dual audio per ½ hour show. Dual audio children scored a mean of 3.8 on an 8-item test of material learned, while control children had a mean score of 1.4. On the technical side it was found that production, broadcast, and reception were executed with no major difficulties. Occasional static and bad batteries were the only problems reported. Detailed parent reporting procedures were revised in a manner to be described later.

The study we are about to describe in detail was designed to extend these investigations beyond the laboratory and short field tests to a month-long, controlled field experiment, testing the effects of dual audio instruction under actual broadcasting-home reception conditions.

OBJECTIVES AND HYPOTHESES:

The primary objective of this experiment was a practical one. We were not interested in making a direct contribution to theory development, but in assessing the effectiveness of a new educational medium. As a result, the specific objectives of the study centered around the practical questions which would need to be answered before dual audio television could be developed as an educational mass medium. Where these objectives lent themselves to an experimental test and where our formative studies

had progressed to the point where we could frame hypotheses, the objectives are presented in hypothesis form:

Objective #1: To test the practicality of conducting dual audio instruction by:

a. establishing cooperative working arrangements between an educational institution and television and radio stations;

b. broadcasting dual audio in synchronization with the TV audio;

c. providing and maintaining radio receivers for the children.

Objective #2: To ascertain the amount and pattern of voluntary usage of available dual audio.

Objective #3: To ascertain the amount of material learned as a result of dual audio instruction. Hypothesis: The mean scores on tests of material learned from watching commercial TV shows with dual audio by experimentals will exceed the scores of the control group on measures of reading, vocabulary, and understanding of problem-solving processes.

Objective #4: To ascertain the effect of dual audio instruction on the social interaction of children. Hypothesis: The use of dual audio will produce a higher mean score for the experimental group than for the control on mean number of comments made during the program.

Objective #5: To ascertain the feelings of children, parents, and teachers about dual audio television instruction.

SAMPLE:

The population of interest for the month-long experiment was Title One primary school children, both because the experiment was funded in part by Title 1, and because these children are the ones who have consistently had the most difficulty in school. Obtaining a random sample from this population was not possible because of financial and logistical problems and the special requirements of the broadcasting situation, but a fairly representative sample was selected in the following manner. Meade School, a Title 1 school in District 2 of Philadelphia (Center City) was selected because it was close to the mean of the 26 such elementary schools in the District on a number of variables: Percentage of black students (99%, Mean=88%); percentage of 2nd grade children scoring below the 16th percentile on the national norms of the 1972 California Achievement, Form A, Vocabulary Test;*(26%, Mean=26%); and percentage of children from low income ($3,000)families (68%, Mean=67%). The school was atypical only in its size (1,529 students), being the largest in the District. All children in the first, second, and third grades of this school were interviewed individually to determine which of them were regular viewers of Astro Boy, the show we intended to provide with dual audio. Regular watchers of Astro Boy were chosen since we felt it would confound our results to ask a child to switch from his favorite program to a new one simply because it had dual audio.

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*This index of reading achievement is the form in which the School District releases such data.

About one third of the children were regular watchers of the program. Co-incidentally, they were not regular watchers of Sesame Street which was on another channel at the same time. Thus the sample used were those children who ordinarily choose a fantasy entertainment TV show over an educational one for afternoon viewing. Eleven older siblings were removed from this group so that there would be only one child from each address, and a letter was sent to all parents informing them that their child was being considered for the experiment. The letter indicated that parents could earn money by participating, and asked them to attend a training meeting or call to express interest. All of those responding (89) were included in the experiment, and the children were assigned to experimental or control groups before we met with their parents.

A post-experiment check on the representativeness of the overall sample and on the effectiveness of random assignment to treatment groups was conducted, and is summarized in Table 1.

TABLE 1

Summary of Check on Representativeness of Overall Sample and Effectiveness of Random Assignment to Treatment Groups

	Blacks	<16% in Reading	Poverty Income	Boys	Girls	H Ach	L Ach	Grade 1	2	3
District Population	88%	26%	67%	50%	50%	50%	50%	33%	33%	33%
Overall Sample N=89*	100%	19% *	75% *	66%	33%	66%	33%	35%	41%	23%
Experimental N=44**	100%	23% *	73% *	69%	31%	66%	33%	27%	46%	24%
Control N=45**	100%	15% *	76% *	64%	36%	66%	33%	42%	35%	22%

*-Approximated because information was lacking on 1-5 children
**-Percentages are calculated against each treatment group seperately

It can be seen from Table 1 that although the random assignment to treatment groups resulted in comparable groups, the overall sample differs from the District population in that it has 12% more black children, 7% fewer children reading below the sixteenth percentile, 8% more children with less than poverty income, 16% more boys, 16% more high achievers, and 10% more first and second graders. We believe that the larger proportion of boys, high achievers, and lower grades were the result of the way the sample was selected, since boys and younger children tend to prefer Astro Boy,(a "boys show" and "kid stuff")and the parents of high achievers are more likely to participate in a school-related activity than those of low achievers.

Once the experiment began, a non-random attrition pattern developed. As will be seen later, parent observation forms were

the measure of whether the children were watching the show, and what they were doing while they watched. Six experimental and thirteen control parents never sent in more than five out of the twenty test-day forms, and as a result we felt that they should be dropped from the sample used in most final calculations, since we did not have accurate information on whether or not they were watching for three-quarters of the test. The characteristics of this group, and their reasons for dropping are summarized in Table 2. A check of the effect which dropping this group had on results was conducted and will be reported later.

TABLE 2

Summary of Characteristics of Students Dropped and Their Reasons

Characteristics and Reasons	N=6 Exper	N=13 Control
Blacks	6	13
<16% reading	1 (2)*	3 (1)*
poverty income	3 (1)*	10 (1)*
Boys	5	7
Girls	1	6
High Achievement	4	8
Low Achievement	2	5
First Grade	3	5
Second Grade	1	4
Third Grade	2	4
Reasons for Dropping		
Child didn't want to watch TV; was out playing, so parent not interested	2	5
Parent decided not to participate	3	3
Parent or child sick or in Hospital	1	3
Unknown	0	2

*Indicates number for which no information was available

DESIGN AND MEASURES:

A block design was used, with assignment on a random basis by treatment, sex, grade, and achievement level, as we believed these were sample characteristics which might affect the results. Achievement level (high and low) was determined by class groupings which were based for first grade on scores on the Philadelphia Reading Readiness Test, and thereafter by the child's progress in his reading program.

The experimental group was loaned small fixed-tune FM receivers over which they could receive dual audio instruction while they were watching Astro Boy. Parents were shown how to use the radio, and asked to show their children. The control group received no dual audio radio, but in all other respects were treated exactly like the experimental group. Dual audio instruction(the independent variable)was broadcast for one month (twenty week days) beginning April 17, 1972. Astro Boy was chosen as the show to use because it was broadcast at a time which was convenient for the parent observers (4:30 P.M.); because it was moderately popular with children but not "the hot one"; because the pace of the show was about average, allowing adequate time for dual audio instruction; and because it contained less violence than the other shows which were being offered by the cooperating TV station.

All twenty Astro Boy shows were previewed and a chart made up indicating the possible areas for sequential dual audio instruction. We had hoped to do much more work at this stage in planning out a curriculum for the month, but our test schedule had been set back by a station program change, and so we moved directly into the writing, production, and research process.

Because the experiment was being conducted in the children's own homes, it was necessary to develop measuring instruments which were not

only reliable, but unobtrusive enough so that they would not change the children's normal behavior. In order to increase reliability, multiple observations and multiple measures were used whenever possible. Specific procedures and measures are described below according to objective.

Objective One, testing the practicality of dual audio instruction, was measured by the establishment of the test condition itself, plus a questionnaire check on the effects of dual audio instruction on regular TV viewing.

Objective Two, assessing the amount and patterns of voluntary dual audio usage, was measured with a time-series, continuous observation before, during, and after the experimental period.

Though we had originally planned to use our own team of observers to keep track of usage, both the advice of other researchers (cf. Ward, 1971) and our own experience in the preliminary testing convinced us that parents would be better recorders than anyone else. In our one-week broadcast test we discovered that the presence of an observer in the home was much more intriguing to the child than either the TV or the dual audio radio, and was so obtrusive as to raise serious questions about the validity of the observation, whereas parents could obtain the same information with a minimum of disturbance. Using parents also had the advantages that they could provide continuous data, were familiar with the child's usual TV habits, and could provide extensive anecdotal information. We decided,

therefore, to use parents as observers, insuring reliability by providing a simple form with instruction sheet, and training them carefully in its use through role plays with video-taped TV shows. A continuous check was kept on the forms as they were turned into the school daily, and any parents who were having difficulty were called. The importance of being accurate and honest in reporting was emphasized repeatedly at all meetings with parents, and in phone or personal conversations. As a check on the accuracy of reporting, the forms required that a brief description of the show be included, so that it was difficult for a parent to say that a child watched a show when he did not. A similar device was used to check on the usage of dual audio instruction. Parents were paid one dollar for a form filled out each day, whether or not it was for Astro-Boy, and whether or not their children used the dual audio radio. (See Appendix B) Thus there was no financial pressure on parents to have their children watch Astro-Boy or use the radio. A further check on the reliability of reporting occurred in the last week when Project staff members visited about one third of the experimental homes, and checked their recording of what was happening against that which the parents had been turning in. Though these visits tended to have the kind of obtrusive effect described above, they were invaluable in providing the staff with first-hand data about what was happening during the dual audio TV broadcasts. As a final check on the

reliability of the information we were receiving on usage, we asked both parents and children separately at the end of the test period how many days the children had watched Astro-Boy and not used the dual audio radio.

An average of 82% of the experimental forms were returned daily, and 72% of the control. All viewing, usage, and number-of-comment figures were calculated from these data. Viewing and usage were figured on the basis of 1 point for "All", .5 for "Some", and 0 for "None." Number of comments were figured at 0 for "None," 3 for"1-5", 10 for "6-15", and 20 for "More than 15."

Parents were instructed to encourage their children to watch Astro-Boy, but not to force them to do so. They were asked to show their children how the radio worked with the TV show, but not to encourage or discourage them from using it, as we wanted to find out whether children would use it voluntarily. For the same reason, no other sources of encouragement such as teacher pressure, posters, celebrity pitches, or the appearance of the dual audio instructor on the Astro-Boy TV show were used.

A log of non-experimental stimuli of possible relevance (weather, TV specials, school holidays, gang killings, etc.) was kept to check for sources of extraneous variance.

The length of the usage test itself was thought to be the best available control for the Hawthorne effect. We expected that the excitement

of a new gadget and the attention from parents would account for a certain percentage of dual audio use at the beginning of the test, but the Nielsen Company's experience with meters and recording systems has indicated that such factors would not be important after the first two weeks. A comparison of the first and second two-week usage provided a check on these Hawthorne factors.

Objective Three, the portion of the experiment testing amount of material learned, used a post-test-only design for experimentals and controls. Conducting pre-tests was considered but rejected because pre-tests of such discrete knowledge items would create a viewing set which might confound the results more than they were likely to be weakened by the absence of pre-measures.

The separate categories of knowledge-learned were tested through a specially constructed, open-ended questionnaire administered orally in a personal interview at school in the first two week-days following the broadcast. (See Appendix C). Media-specific tests were considered as being more directly related to the independent variable (Schueler and Lesser, 1967), but rejected because the intent of dual audio instruction is that the learning be transferred to other settings. Though a good argument can be made for using more broad-gauged standardized instruments, as Sprigle (1971) and Voyat and Lesser (in press) have done in criticizing the Sesame Street research

(Ball and Bogatz, 1970), the amount of dual audio narration used in this study was too limited to produce changes which would register on these tests, so the Sesame Street approach of using a specially constructed test was followed.

The test consisted of fifteen items which were used in the final score, plus various lead-in, relief, and wind-up questions, and some more informal subject matter questions. The areas tested were reading, vocabulary, and the understanding of basic learning processes such as "experimenting". Reading and vocabulary were selected for testing because of their obvious importance for success in school; understanding of processes because it is one of the most powerful and widely applicable kinds of knowledge which dual audio might teach. The test included three items on reading (recognition of "Astro", "Boy", and "hotel")* six on vocabulary (SOS, mammoth, transform, disguise, revenge, and intentions), and six on understanding processes (experimenting, investigating, combining things, communicating, confronting someone, and having a point of view.) The items tested had received a wide range of treatment during the month's narration, running from as many as 56 explicit teachings and mentions for "point of view", to 5 for "SOS."

The formal section of the test was followed by an informal section which could not be analyzed statistically. In this informal section the children were asked to spell the three reading words of the formal test,

*The test of reading, unfortunately, was severely limited because Astro Boy, unlike many cartoons, had very few reading words on it to teach.

since we had made an attempt to teach this during the last week of programming. Those children who gave correct answers to the three process questions on "combining things", "communicating", and "point of view" on the final test were asked additional questions on those items which attempted to explore the depth of their understanding of those processes by asking for examples. All questions, formal and informal, were pre-tested for clarity on other children from the sampled population, revised, and pre-tested again.

Objective Four, the social interaction portion of the experiment, was of the pre-post control group type, with time series observations taken before, during and after the experiment. We had originally intended to measure social interaction on a parent check-sheet such as that developed by Ward (1971), but pre-tests indicated that this was too complicated for the parents to handle. A second alternative of having parents write down everything the child said or did in reaction to the TV or dual audio produced a fascinating array of detailed information. Unfortunately it was almost as obtursive as having an outside observer, with the additional confounding variable of the child having his mother's complete attention for half an hour. We eventually assigned 20 random parents to use the verbatim reports (Appendix D) and all others to check off an estimate of the number of comments which their children made during the show. (Appendix C) These parents were asked to keep an eye on their child during the program though not necessarily stay

with him, and then fill out the form after the show in a different room than the child, indicating anything they could remember him saying or doing. While on balance we felt this was the best measure we could obtain, it is a rough one, and comparative figures on number of comments need to be treated with caution. Additional information on the reactions of older and younger siblings, and "zombie" or "hypnotized" viewers was collected by questionnaire at the end of the test. A final source of information was the staff visits mentioned above.

A content analysis was performed on the comments reported on the verbatim forms to determine what differences dual audio made in the quality of social interaction.

Objective Five, the assessment of feelings about dual audio instruction, was made through questionnaires administered to parents(Appendix E) and teachers (Appendix F) after the experimental period, and by group interviews with parents at the conclusion of the test period. The parent questionnaire, which also served as the basis of back-up information for other objectives, was used in the experimental group only and was divided into two sections to make it less imposing. Since it covered feelings about dual audio, and parents who had been dropped might be expected to have negative feelings, the responses of dropped parents were included in all tabulations. There was a return of 91% on the first section of the questionnaire and 81% on the second.

The results on all objectives were analyzed statistically when appropriate.

STATISTICAL ANALYSIS:

Objective 1, Practicality, was analyzed with a one-tailed t-test between the means percentages of experimental and control Astro Boy viewing. Objective 2, Usage, was analyzed with a correlation of viewing and dual audio usage with total test scores. Objective 3, Material Learned, was originally designed to be analyzed with an ANOVA of treatment, sex, achievement level, and grade, but the high drop out rate in the control group reduced the number of subjects in some cells to zero, which made this ANOVA unrealiable. Consequently, t-tests were run within the experimental group on sex, achievement, and grade differences. All were significant except between-grade differences, which were only significant when first and third grades were compared ($p. < .10$), so grade level was dropped as a factor, and an ANOVA was run on the remaining factors. Objective 4, Social Interaction, was analyzed with a one-tailed t-test, for number of comments with a correlation between number of comments and total test score, and with a chi-square with Yates correction for comparisons of percent of comments of higher cognitive complexity. Objective 5, Feelings about Dual Audio, required no statistical analysis. Significance levels were determined in order to give an estimate of the strength of the differences, though because the sample was not randomly selected, they do not indicate statistical generalizability to the larger population of interest.

RESULTS:

A summary of major results, together with objectives, measures and analyses, and significance levels is provided in Table 3.

TABLE 3

Summary of Objectives, Measures and Analyses, Major Results, P. Values

Objective	Measures & Analyses	Major Results	P. Value
1.Practicality		N_e = 38 N_c = 32	
a.Establish relations with TV and radio	a.Conducting Exper. Parent report on % Of AB viewing. t-test.	a.Excellent relations established Mean AB Viewing E=90% C=69%	.005
b.Synch DA-TV	b.Conducting Exper.	b.Perfect synch maintained	
c.Maintain radios	c.Damage inspection Questionnaire	c.33% radios damaged 79% already had FM radios	
2.Usage			
a.Amount of DA usage	a.Parent report on % of usage	a.83% mean usage of DA while watching AB	
b.Correlation of AB viewing with total test scores	b.Pearson's r.	b. E=+.28 C=+.11	E=.05 C=nsd
c.Correlation of DA use with total test score	c.Pearson's r.	c. E=+.29 ___	.05
3.Material Learned			
a.Total test	a.Oral test, 15 items	a.Mean of Items Correct E=6.2 C=3.3	.001
b.Reading	b.3 items	b. 2.2 1.8	.04
c.Vocabulary	c.6 items	c. 2.2 1.0	.004
d.Process	d.6 items	d. 1.7 0.5	.001
4.Social Interaction			
a.# comments	a.Parent report	a.Mean # Comments Made During TV Program E=5.3 C=3.4	.025
b.Correlation of # comments with test	b.Pearson's r.	b. E=+.26 C=+.25	.10
c.Quality of comments	c.Content analysis of parents verbatim reports on comments during TV. Chi-square.	c.% Cognitively complex comments E=41% C=23%	.001
5.Feelings about DA			
a.Children	a.Questionnaire	a.100% liked DA 75% reported DA increased TV enjoyment	
b.Parents	b.Questionnaire Parents meeting	b.DA excellent 25% DA good 75%	
c.Teachers	c.Questionnaire	c.Inconclusive	

*AB=Astro Boy
**DA=Dual Audio

Objective 1:

Practicality was put to a month-long test by setting up and conducting the new cooperative arrangements with television and radio stations which were necessary for the experiment. There were no major problems with these arrangements, though there were minor difficulties keeping everyone informed of schedules, and training engineers to throw the switches necessary to keep the dual audio programming on the air. The radio station was a public station and saw dual audio instruction as an avenue for further service. The TV station was a commercial one, but interested in providing public service if it could do so without financial loss. It's interest was appreciably increased by the fact that a comparatively large number of control children dropped out of the experiment because they were playing outside and not watching TV, (C = 5, E = 2) and by the difference in average viewing of Astro Boy: Experimentals watched Astro Boy 90% of the time, controls 69%, a difference of 21%, significant at the .005 level. These figures are of practical significance because they indicate that children may be more likely to watch a program if it has a dual audio supplement, though because the controls also watched less before the test period, these findings must be considered tentative. There was a non-significant correlation of +.11 between the percentage of time control children watched Astro Boy and their test score. The correlation for experimentals was +.28, significant at the .05 level.

Patterns of viewing, with important extraneous variables, are indicated in Figure 1.

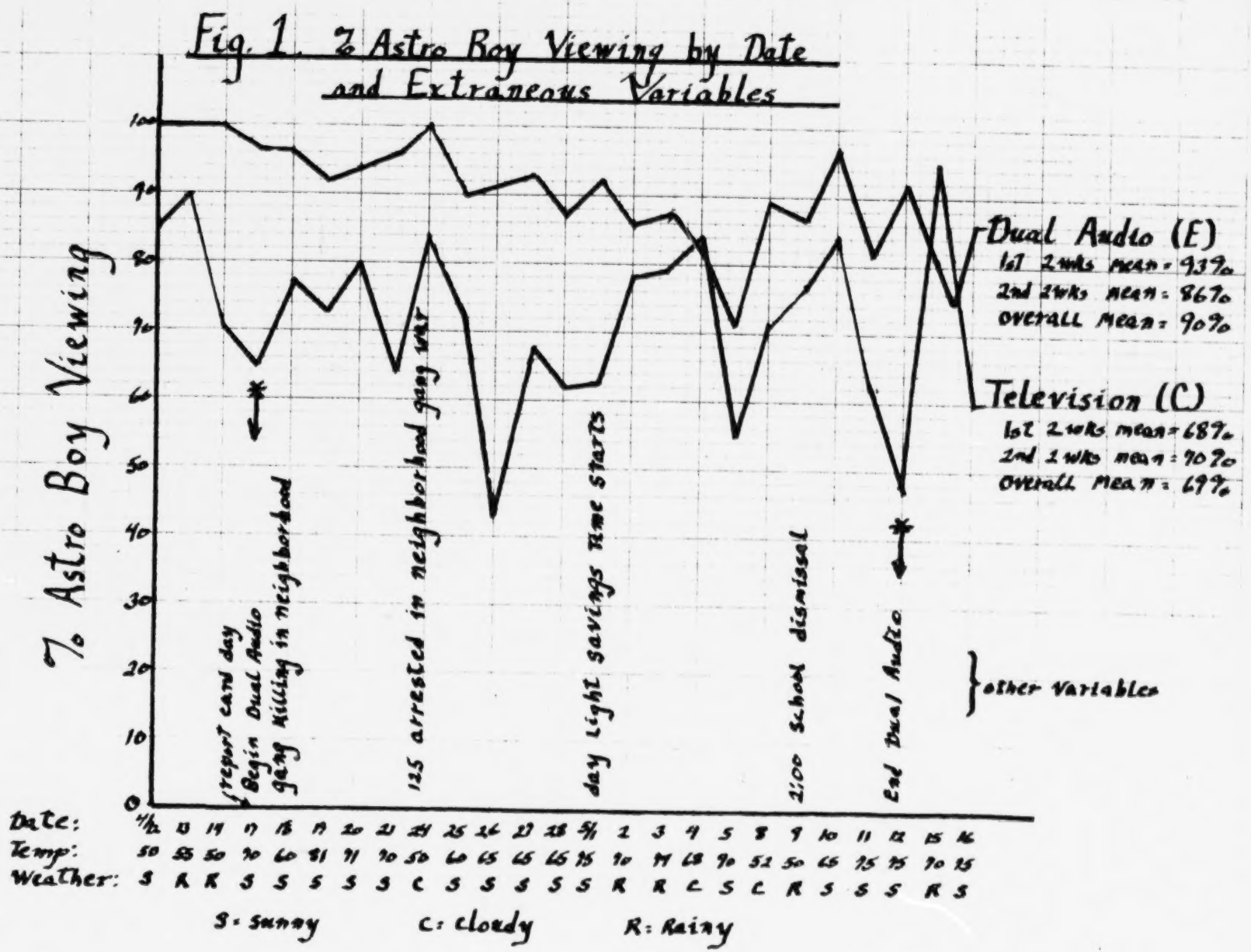


Fig. 1. % Astro Boy Viewing by Date and Extraneous Variables
% Astro Boy Viewing
100
90
80
70
60
50
40
30
20
10
0
report card day
Begin Dual Audio
gang killing in neighborhood
125 arrested in neighborhood gang war
day light savings time starts
2:00 School dismissal
End Dual Audio
Dual Audio (E)
1st 2 wks mean = 93%
2nd 2 wks mean = 86%
overall mean = 90%
Television (C)
1st 2 wks mean = 68%
2nd 2 wks mean = 70%
overall mean = 69%
other variables
Date: 4/12 13 14 17 18 19 20 21 24 25 26 27 28 5/1 2 3 4 5 8 9 10 11 12 15 16
Temp: 50 55 50 70 60 81 71 70 50 60 65 65 65 75 70 71 68 70 52 50 65 75 75 70 75
Weather: S R R S S S S S C S S S S S R R C S C R S S S R S
S: Sunny C: cloudy R: Rainy

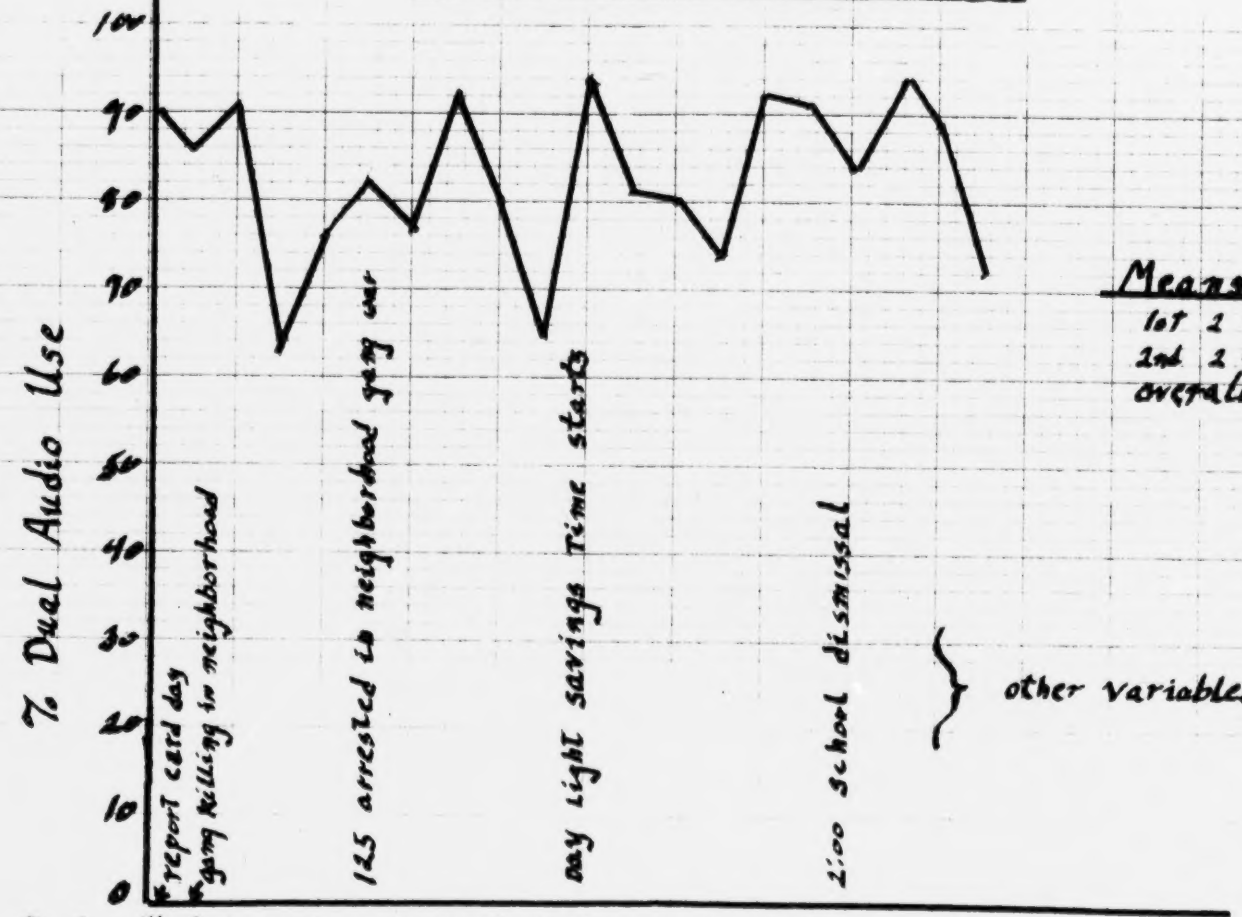
Radio distribution was easily accomplished by giving the radios to the mothers who in turn taught their children how to use them. Sixty percent reported some difficulties with the radios; the most common reported difficulties were dead batteries (32%) and broken antennas or dials (13%). Thirty three percent of the radios were actually returned damaged, though the damage appeared to be the result of accidental breakage of a rather flimsy radio chasis rather than willful destruction, of which there was no evidence. Most children were observed taking great care of their radios, for example, hiding it in their mother's bureau, or in the cooking cupboard. The need to maintain radios at all may be obviated by the fact that 72% of the experimental parents already had FM radios; 92% of this radio-owning group said that they would be willing to let their children use the radios in the future to listen to dual audio instruction; and 68% thought the children would still want to listen without the Project providing a radio for the children to use.

Objective 2:

The amount of dual audio usage was defined as the percentage of time when a child was using the dual audio radio while watching Astro Boy.* The mean usage rate was 83%. Day-by-day usage rates with possible extraneous variables are displayed in Figure 2. The expected decrease in usage due to the Hawthorne effect did not materialize; usage rates for the first two weeks had a mean of 80%, with 85% the second two weeks. There was correlation of +.29, significant at the .05 level,

* Thus it would be possible for a child to watch Astro Boy 100% of the time but only use the dual audio radio 50%, or watch 50% and use the radio 100%, yet receive the same usage score of 50%.

Fig. 2. % Dual Audio Use by Date and Extraneous Variables



Means:
1st 2 wks = 80 %
2nd 2 wks = 85 %
overall = 83 %

Date	4/17	18	19	20	21	24	25	26	27	28	5/1	2	3	4	5	8	9	10	11	12
Temp.	70	60	81	71	70	50	60	66	65	65	75	70	74	68	70	62	60	65	75	75
Weather	S	S	S	S	S	C	S	S	S	S	S	R	R	C	S	C	R	S	S	S

S = Sunny C = cloudy R = Rainy

between the percentage of time a child used the dual audio radio and his total score. The fact that this was a low correlation may be accounted for by the high mean usage rate, which meant there was little variance with which to establish a correlation.*

Seventy-eight percent of the parents felt that their child would continue to use the radio if they were not keeping track of him and sending in forms. Twenty-five percent estimated that their child would continue using the radio for 1-3 months, 33% for six months to a year, 25% for two years.

Sixty-three percent of the parents reported that younger children were watching with the Project child, were interested in the Program, and were participating in it. Specific reactions were asking and answering questions, singing along with the instructor, using the receiver as a walkie-talkie, holding it, and fighting over it. Fifty-six percent of the parents reported that older children (up to age 15) were also watching. Twenty-five percent said that the older children enjoyed the ddal audio program, and liked listening to it; the other major reaction was that, "It's a good idea for the little kids." There was one report of negative comments from older children.

A summary of a few scenes reported by Project staff members who visited homes in the last week of the test will give a flavor of how dual audio instruction looked and sounded under different home conditions.

> Six children, aged 2-12, are in the living room. When Astro Boy comes on the TV, the Project child runs to get the dual audio radio, singing along with Steve as he comes

*Since 18% of the experimental report forms were not turned in, it is possible to c nstruct a lowest possible limit of dual audio usage of 67% by assumming that all of these forms would have shown no dual audio usage, rather than correspond to the mean of 85%.

on. Most of the children group around the radio on the floor, responding to Steve's comments, with the youngest children simply repeating them, and the older ones answering questions, and talking about what it said. When Astro Boy goes off, the Project child turns off the radio and returns it to his mother's room.

Seven or eight children running in and out, playing with a top on the floor, fighting with the dog, watching TV, and listening to the dual audio radio. No one responds to it except to sing the song, and occasionally pick it up to listen to it. There is so much confusion that it is impossible to connect what the radio is saying to what is happening on the TV.

Two children, both aged 6, sit in a "television room" by themselves. Neither says a word during the program. They take turns holding the receiver, with the commercial being the signal for a new turn.

A group of boys sits around the kitchen table with the receiver in the middle. The oldest boy, aged 12, has taken charge. As the dual audio instructor talks, this boy moderates a discussion, such as might be on a TV talk show.

Objective 3:

The total test scores on material-learned by experimental and control groups were significantly different at the .001 level, with the experimentals obtaining a mean score of 6.2, and controls 3.3.* Subtest mean scores for experimental and control were respectively 2.2 and 1.8 for reading ($p. < .04$), 2.2 and 1.0 for vocabulary ($p. < .004$), and 1.7 and 0.5 for process understanding m($p. < .001$). The hypothesis that the mean scores for experimentals on total and sub-tests of material-learned would exceed those of controls was accepted. Since the overall test scores for experimentals were close to twice those of controls, these test results have

* As a check on whether total test scores had been skewed by the differential drop out rate, the test was also given to dropped children. When their scores were averaged with the non-dropped children, the experimental mean was 5.6, the control 3.3, a difference which was significant at the .005 level, so that dropping those for whom there was inadequate viewing information did not seem to have biased the results appreciably in the experimental group's favor.

practical as well as statistical significance. They indicate that dual audio instruction had a sizeable effect on what these children learned from watching television.

The results of the analysis of variance on total test scores are presented in Table 4.

TABLE 4

ANOVA for Treatment, Sex, and Achievement Level on Total Test Socres

Source	SS	DF	MS	F	P Value
Within Cells	685.803	62	11.061		
Treatment	140.155	1	140.155	12.671	0.001 *
Sex	25.494	1	25.494	2.305	0.134
Achievement	97.516	1	97.516	8.816	0.004 *
Treat X Sex	18.926	1	18.926	1.711	0.196
Treat X Ach	24.320	1	24.320	2.199	0.143
Sex X Ach	22.869	1	22.869	2.067	0.155
Treat X Sex X Ach	0.001	1	0.001	0.000	0.992

As may be seen from Table 4, achievement was the only factor other than the treatment condition of dual audio instruction where the main effect was significant. This is not suprising, since one would assume that high achievers would achieve higher results than low achievers on the test, as indeed they did. An ANOVA was also run on mean scores for the sub-tests of reading, vocabulary, and process understanding. Achievement main effects were also significant in all of these. There was a significant sex main effect on the vocabulary items ($p < .05$), and a significant sex X achievement interaction for reading ($p < .01$).

After the main body of the test, several supplementary questions were asked. An attempt had been made to have the children spell the reading words during the last week of broadcast. In the supplementary test we asked them to spell the same three words we had asked them to read ("Astro","Boy" "Hotel"), even though such repitition of items was not a very desirable

testing procedure. There was no significant difference in scores between experimentals and controls on these spelling items. The supplementary test also included an opportunity for all children who got the process items correct to give examples of the meaning of "combining things," "communicating," and "point of view." All experimentals (13) who gave satisfactory answers on the test were able to give examples of how the process was used. The 3 controls who got at least one item right could also give examples, though all three thought that the way to change someone's point of view was to fight him, while experimentals mentioned helping someone, tricking him, thinking things over, doing something nice for someone, explaining things, and seeing that you are wrong.

Evidence from the parent questionnaire suggests what the material-learned from dual audio instruction meant to the children, and how they reacted to it. One hundred percent of the parents thought the dual audio instructor was teaching material which was important for their children to know. Eighty-eight percent thought that their children learned from the dual audio instruction, citing as reasons the fact that they paid attention to the program and used the words taught on it. Fifty-eight percent said that their child used the words "during the program," 33% "after the program", 20% "much later", and 20% "not at all."

Objective 4, Social Interaction:

The amount and quality of social interaction was determined through the parent observation forms, both general and verbatim. Experimentals made a mean of 5.3 comments, controls made 3.4, a difference which is statistically significant at the .025 level, and of practical significance because it represents 55% more overt involvement with the informational environment of the TV for the children using dual audio. A correlation of mean number of comments with mean total test scores produced a coefficient of +.26 for experimentals and +.25 for controls, both significant at the .10 level, but of little practical significance because they are so low.

An analysis of the verbatim report forms alone showed experimentals making a mean number of 10.3 comments and controls 7.7, roughly double in each case what was reported on the general forms. As discussed earlier, both verbatim and general measures have sources of unreliability, but the fact that both give about the same proportion of experimental-to-control comments is an indication that this proportion may be quite reliable.

Additional evidence for the hypothesis that dual audio instruction increases the interaction of children came from questionnaire items regarding those "zombie" children who become "hypnotized" by TV and lapse into a state where they seem completely unaware of anything but the TV screen. Forty-nine percent of the parents said that the dual audio instruction made their children

less hypnotized; 22% reported no change; 2% reported that their children were sometimes more hypnotized. A comparison of interaction patterns with dual audio instruction and with Sesame Street was also made, since it is a high involvement educational program. Forty eight percent of the parents reported that their children did not watch either Sesame Street or The Electric Company on a regular basis; 38% did. Of those who did watch, 37% reported more participation with Sesame Street, 44% reported the same response as to dual audio.

Since the general and verbatim reports on the amount of social interaction both showed more comments by experimentals and were confirmed by the questionnaire results, the hypothesis that the experimentals would make more comments during the TV show was accepted.

A content analysis of the verbatim parents reports is summarized in Table 5 and provides information on the quality of comments. Though the categories were derived from an empirical examination of actual comments, they have been arranged in an approximation of Bloom's taxonomy of cognitive educational objectives, as indicated in the Table by the category references and numbers in parentheses (Bloom, 1956). When so arranged, experimentals have close to twice as high a percentage (41% to 23%) in the cognitively complex half of the categories, indicating that experimentals were making more "conscious" comments as they watched TV. An analysis of the difference between control (expected) and experimental (actual) frequencies gave a chi-square of 19.3, significant at the .001 level.

TABLE 5

Percentage of Types of Responses During TV Program, Arranged in Increasing Order of Cognitive Complexity, According to Bloom's Taxonomy

Type of Response, Arranged in Cognitive Hierarchy	Control	Exper.
Responding Physically (Psychomotor)* Dancing, chewing fingers, jumping	3%	0%
Expressing Verbal Excitement (Affective)* "Get him!" "Ooooh, Oh!"	8	8
Singing (Knowledge of Specifics, 1.10) "Astro Boy bombs away/ On his mission today."	8	4
Repeating (Knowledge of Specifics, 1.10)** "He said, 'Astro Boy's lost.'"	1	4
Orienting (Knowledge of Specifics, 1.10) "Look at the monster." "See that. . ."	17	2
Describing (Knowledge of Specifics, 1.10) "Astro Boy's got big eyes." "That's a . . ."	35	23
Reading (Translation, 2.10) "Astro Boy" "Hotel"	2	3
Questioning (Translation, 2.10) "Mom, what he be doing now?"	8	9
Plot Guessing (Extrapolation, 2.30) "I bet he's going to fix his brain."	7	3
Analyzing, Reflecting (Analysis of Elements, 4.10) "He's a little squirt, but he always wins."	5	7
Personalizing (Producing a Unique Communication, 5.10) "I can make a picture like that." "My uncle and the air force could stop them."	1	11
Explicit Learning (Production of a Plan, 5.20)*** "I know what 'experimenting' means." "He's talking about 'point of view' again."	0	8
	23%	41%
Other Responses		
Comments about the Medium		
Television--"Fix the picture."	2	2
Dual Audio--"I want to hold it now."	-	5
Unclassified****	3	11
	100%	100%

*Psychomotor and Affective are other taxonomies parallel to the Cognitive, but are here treated as rudimentary ways of responding to the TV stimuli. (cf. Bloom, pp. 19-20.)

**Almost all of these repetitions were of incidental (not educational) comments of the dual audio instructor.

***This was the most difficult category to fit into Bloom's taxonomy. It is placed in its present position because these comments seem to indicate that the child is consciously and explicitly learning from the dual audio instruction and is using it in a planned way for that purpose, a behavior which is consistent with the higher "levels of consciousness and awareness" which Bloom believes typlifies the more complex levels of cognitive activity. (Bloom, p. 19)

****The large number of Unclassified experimental comments is because they are answers to the dual audio instructor's questions, and have an unclear referent.

Objective 5, Feelings about Dual Audio:

The children's own feelings about dual audio instruction are perhaps best indicated by their 83% rate of voluntary use of it, but child and parent questionnaires gathered additional evidence. One hundred percent of the children reported that they liked listening to the dual audio radio; 43% of the parents thought their children liked listening "very much", 43% "a good deal", and 10% "a little." Other parent descriptions of the children's reactions are summarized in Table 6.

TABLE 6

Parent's Description of Child's Reactions to Dual Audio Instruction

Effect of Dual Audio Instruction on Child's Enjoyment of TV Program		
Increased enjoyment. .73%	No change. . ... .25%	*Interrupted enjoyment 0%
Effect on Child's Perception of Dual Audio Instructor		
Like a friend.....73%	Like a teacher.... 8%	Crazy in a bad way 0%
Crazy in a good way...38%	Like a brother.... 8%	
Cool.....16%	Jive (bad)..... 2%	
Effect on Child's Thinking During the TV Program		
Helped him think more for himself.....73%	No change..... 3%	*Stopped him from thinking for himself..... 0%

* These expressions were used on the questionnaire, rather than "Decreased enjoyment" or "Decreased thinking for himself" because they were the form in which many people couched their speculations on the effect of dual audio instruction, and we wanted to explicitly test these speculations against parent perceptions.

Parents indicated that when they first heard of dual audio instruction, 62% of them were interested and thought it would be good for their children; 18% were skeptical or apprehensive, several having doubts about whether their children would listen. After the program, 25% rated

their overall reaction to dual audio instruction as "excellent", 75% as "good", none as either "fair" or "poor." Table 7 indicates those items which parents liked and did not like about the dual audio instruction program:

TABLE 7

What Parents Liked and Disliked About Dual Audio Instruction

Liked	
It teaches vocabulary, reading, spelling	38%
It helps kids learn and pay attention	28%
It helps explain the program	25%
It adds jokes to the TV program	20%
It helps to show how educational a cartoon can be	18%
It helps the child think of comments of his own	15%
It's like a teacher treating you to a show	12%
It gives the child something constructive to do	10%
Disliked	
Nothing	75%
The program didn't go on long enough	10%
Didn't have a radio for the other children	8%
Children had trouble understanding the radio because of static	2%
Instructor's language could have been more sophisticated	2%
Program might become monotonous	2%
Filling out the forms was inconvenient	2%

Eighty-eight percent of the parents said that they themselves enjoyed listening to the dual audio instruction, and 17% said that they themselves learned something from it--not about the material being taught, but about their child and what he could learn from TV. Eighty-five percent of the parents felt that the dual audio instruction program

should be continued (2% did not; 10% blank). Forty-three percent thought it should be continued "very much," 48% "a good deal", 5% "a little" and 0% "not at all."

In the week following the end of dual audio instruction a meeting was held with all parents to talk about their reactions. The response was over-whelmingly positive. Transcripts of a few recorded comments will give a flavor of the meetings:

> I think the children felt that he [Steve] was someone they could relate to, like he was almost on their level. . . . It wasn't like a adult ordinarily talking to them. . .in one ear and out the other because they couldn't understand.

> A lot of different shows would be good for dual audio. You could switch around.

> Kids ask parents a lot of questions and sometimes we don't know how to answer them. Maybe Steve would. (Laugh) It would really be a big help.

> It's one of the best things that ever happened to children this age because children usually sit in a stupor and look at TV like they're not made to think and this radio got them to thinking.

The feelings of teachers who had sample children in their rooms were ascertained through a questionnaire following the experimental period. (See Appendix F.) They had been told about the program before the experimental period, and several follow-up letters described how to receive the program on a home FM set. In the last week, the Project offered to provide fixed-tuned FM receivers to any teachers who wanted them. Six of the 21 teachers returned the questionnaire; of these, 2 had listened to the dual audio program. Because of this low return-rate, and the even lower number of teachers who actually heard the program,

the questionnaire did not provide results which could be analyzed, though the 2 teachers who heard it rated the program as "good" and thought their children "liked it a lot." The low return and listening rate is in itself probably the best indication of how teachers felt about dual audio TV. Though these behaviors could mean many things, our interpretation was that most teachers were not very concerned about what children might learn outside of their own class.

LIMITATIONS OF THE STUDY

Lack of random sampling was an important limitation of the study because, although we believed the sample to be fairly representative, the results could not be statistically generalized to a larger population. The unexpected and non-random rate of attrition forced us to use a different statistical analysis than we had planned. While we felt that the parent report forms gave a reliable measure of viewing and dual audio usage, it gave only a rough estimate of number of comments per child. Because there were so few words to read in Astro Boy, and hence to test, these results must be treated with caution. In any case, the only reading taught was word recognition, not phonics or comprehension. Because all experimental children were provided with radios, it is impossible to separate the effects of the instructional program itself from the effect of having the radio. It is difficult to know whether the length of the study was sufficient to control for the Hawthorne effect, especially since no decrease in usage was noted, and since parents were so heavily involved in the research process. Hence it is difficult to generalize about what might happen over a longer period. Finally, all testing was

done using program-specific tests. Although there were significant differences between the experimental and control groups, the long-range social significance of reading scores and other measures of achievement cannot be determined without a longer broadcast period and more broadly gauged testing instruments.

SUMMARY AND CONCLUSIONS:

The data reported in this study indicate that dual audio instruction is practical, in that the necessary arrangements with TV and radio stations were made, and TV and dual audio sound tracks synchronized. Though there were some difficulties in maintaining radios, the necessity for doing this may be avoided if, as evidence indicates, a large percentage of poor people already have FM radios and are willing to let their children use them for dual audio instruction. The dual audio radio was well used and would probably continue to be so for some time. Use of the radio was general in the family, including younger and older siblings. The hypothesis that experimental children using dual audio would learn significantly more than controls in reading, vocabulary, and process understanding was accepted, as was the hypothesis that experimental children would make significantly more comments than controls. Experimetal children also made twice as high a percentage of cognitively complex comments. Teachers were non-commital about dual audio instruction; children and parents were generally enthusiastic.

The results of this study confirm those of laboratory studies with socially different populations in both Cambridge, Mass., and Philadelphia, and two smaller field experiments made with different samples from the same Title 1 population used for this experiment. Such replication provides additional evidence for accepting, at this formative

stage, the overall hypothesis that dual audio instruction increases the educational impact of commercial television. But before these results can have wide applicability, further research is necessary to ascertain what effect dual audio might have if it were a mass system.

IMPLICATIONS FOR FURTHER RESEARCH:

The Dual Audio Televison Project is presently engaged in conducting what we believe are the next logical research steps: to test the effects of dual audio over a longer time period with larger numbers of children, to test out various teaching procedures, to test material-learned more extensively, to test the effect of supplying children with a dual audio instruction program but not a radio, to test the effect of dual audio with and without parent involvement, and to begin to explore new areas such as the teaching of foreign languages. The results of these experiments should provide a much more conclusive assessment of whether dual audio instruction can be an effective educating mass medium.

IMPLICATIONS FOR PRACTICE:

If further research produces positive results, then the possibility exists for creating a new kind of voluntary supplemental educational system. A dual audio broadcasting system could operate using an FM radio frequency, presently unassigned cable channels (Trelow, 1970), or radio SCA bands which are largely unused at present (Parker, 1969). A child could then check his TV guide (or friends) to find out which shows were "dual audio" and turn the dial on his dual audio receiver for dual audio programs. By providing dual audio instruction for those programs most heavily watched by children, it would be possible to provide the average child

who watches TV with several thousand hours of additional instruction per year at negligible cost per child.

There are also a great many intermediate or alternative ways in which dual audio instruction could be utilized, other than full-scale broadcasting. Dual audio narration could be written in cooperation with the program's production, or it could be prepared from video tapes made during the initial airing, and used when the re-runs are scheduled at children's viewing time. Foreign countries could use a dual audio approach to help their citizens understand English-language productions without the expense of dubbing, and the same process could be used for foreign language programs in the United States. The rapid spread of cable TV, with its increasing choice for the viewer, will offer additional possibilities for dual audio because of the large number of channels. As the cassette TV market builds, cassette programs (retailed or library) could be provided with a choice of dual audio commentary. Since preparation of dual audio scripts is inexpensive compared to the cost of producing a TV show, local communities could prepare their own dual audio commentary for nationally aired programs, thus combining the financial resources necessary to produce quality TV programs with the knowledge of local conditions necessary to have people feel in touch with their media. Initial explorations (Borton and Morrow, 1970a) have indicated that parents can be helped to use a dual audio approach with their own children without a radio broadcast. Such an approach might be a valuable contribution to parent-training programs in Headstart or daycare centers.

VALUE QUESTIONS:

Because of the wide range of practical implications which dual audio TV instruction may have if further research shows it to be feasible on a mass scale, we think it is important at this formative stage to raise a number of value questions about its use We are personally pleased with the contributions we think dual audio instruction has made to the children we worked with. But dual audio televison is potentially an extremely powerful tool whose effects may extend far beyond those children that we ourselves see. While we believe that dual audio instruction may turn out to be an exciting new way to help children learn about their world and gain greater control over their own lives, we fear that it could also be used to propogandize, to exploit, to mechanize, and to de-humanize.

The issues involved in deciding what purposes dual audio shall serve are not ones which can be answered through a research study, though researched information can help in making value judgments. Nor should the developers or researchers of dual audio decide questions of purpose by themselves. Such issues are a public trust, and need the participation of many sectors of the public to resolve them. Accordingly, in addition to the proposed research described earlier, we are organizing a national task force to make recommendations on the following questions:

--What educational, social, and psychological goals should dual audio pursue?

--What code of ethics is appropriate for dual audio instruction?

--Who should control what is said on dual audio instruction, and how it is presented to children?

--What legal, technical, financial, and organizational arrangements will insure that dual audio TV is of greatest help to children?

--What are the proper relations between a public-service dual audio instruction system and commercial TV, particularly on such issues as advertising, violence, and racial sterotyping?

--What is the proper relation between a dual audio instruction system, and the school system?

--What rights and protections should the child-consumer have?

We believe that great care should be taken before any new medium is introduced to children, and that every effort should be taken to insure that such a medium operates for their benefit. Research, careful investigation of value questions, and public discussion are the best ways we know to insure that dual audio TV instruction will be a positive presence in the lives of children.

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